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Experimental and Research Station,

Nursery & Market Garden Industries'

- - Development Society, Limited, - -

Turner's Hill, Cheshunt, Waltham Cross, Herts.

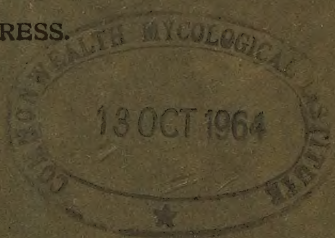


**First Annual Report,
1915.**

Director—A. B. LISTER, D.I.C., B.Sc.

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* Nominated by the Committee of the Lawes' Agricultural Trust, Rothamsted, Harpenden,
Herts.

† Nominated by the Lea Valley and District Nurserymen's and Growers' Association,
Limited.

Director's General Report.

IN presenting the First Annual Report of the above Station, which has been established for the benefit of the nursery and market garden industries, a brief outline of the foundation of the Station will not be out of place.

Unlike Agriculture, the glasshouse industry had received no special attention from the county authorities, and no official demonstrations or experiments had ever been carried out. Some of the Rothamsted investigations, however, were found to bear so closely on the grower's problems that local demonstrations were arranged, and it was pointed out that the only hope of developments in this direction lay in the establishment of a separate Station where exclusive attention could be given to the grower's problems.

The Lea Valley and District Nurserymen's and Grower's Association were so impressed with scientific methods of research and their application to successful cultivation of crops, especially in the intensive culture practised in the Lea Valley, that they decided to take the necessary steps for the erection of a Station in their midst, to be solely devoted to the elucidation of the many problems to which the growth of fruit and vegetables under glass gives rise.

It was further decided that the proposed Station should be of a national character, and it was found convenient to delegate the management to a new Society, founded expressly for the purpose under the name of the Nursery and Market Garden Industries' Development Society, Limited, and registered under the Industrial and Provident Societies' Act of 1893.

The Hertfordshire County Council made a Capital Grant of £300, and the Essex County Council a Maintenance Grant of £50 for three years. His Grace the Duke of Bedford, K.G., gave £200 to the Capital Account and £50 a year for five years to the Maintenance Account. The Members of the Society raised amongst themselves a sum of nearly £800 for the Capital Account and guaranteed a sum of £184 to the Maintenance Account for a period of five years.

Thereupon the Board of Agriculture and Fisheries, out of funds provided by the Development Commissioners, agreed to furnish a sum not exceeding £1,300 to the Capital Account, and a grant not exceeding £600 to the Maintenance Account of the first year.

The management is vested in a Committee of fourteen Members, seven of whom, including the President and Honorary Treasurer, are nominated by the Lea Valley and District Nurserymen's and Grower's Association; five by the Committee of the Rothamsted Experiment Station, Harpenden, Herts; and one by each of the contributing County Councils.

In the Spring of 1914 a Freehold Site of about two acres on the main London to Cambridge Road was secured, and building operations were commenced in the Summer of that year. The glasshouses, office, and laboratories were built by the end of 1914, but the internal fittings of the latter were not completed till September 1915. The Station property at present consists of an Office; one Botanical and one Chemical Laboratory; five cucumber culture houses; five tomato culture houses; an isolation house for pot experiments and disease inoculation work; and some reserve land for future extensions. The total Capital outlay was £3,278, and of this a sum of £2,628 has been paid, leaving a debt of £650 in the form of a loan from the Bank, secured on the property of the Station. The total account for Maintenance to date has been £1,580.

The Director, appointed in May 1914, took up his duties in October of that year, and for the first few months was chiefly engaged in the building, stocking, and equipping of the Station in all its branches.

During 1915 the Director made a systematic visitation of all the nurseries within about eight miles of the Station, visiting no less than 160 different nurseries in the districts embracing Broxbourne, Cheshunt, Chingford, Enfield, Hertford, Hoddesdon, Waltham Abbey, and Waltham Cross; these nurseries being chiefly concerned with the cultivation of Cucumbers, Tomatoes, Grapes, Peaches, Roses, Carnations, Sweet Peas, Chrysanthemums, Arums, Ferns, Palms, and General Bedding Plants.

Growers are invited to apply to the Station for information and advice respecting bacterial, fungoid, or insect pests, fumigation, manuring, soil analysis, soil sterilisation, spraying, water analysis, and other problems of crop production. Considerable numbers have taken advantage of the facilities offered. Many growers from other districts have visited the Station during the season, and the local growers have shown particular interest in its progress.

The experiments carried out during 1915 were necessarily of a preliminary nature. In the first instance it was essential to standardise the soil in the five tomato houses, so as to

ascertain the error of experiment involved in any future manurial programme, and this was done by treating all the houses uniformly and growing the same number of each of fifteen varieties in each house, and carefully recording growth and crop returns. (See Table I.)

In the isolation house, however, a definite trial was made in pot culture experiments with "Humogen" on seven varieties of tomatoes (see Table II.), and in the cucumber houses one section was devoted to tests with "Humogen" on two varieties. (See Table III.)

In the remaining sections of the cucumber houses, records were taken to form the basis of a physiological research on the effect of the various factors such as temperature, humidity, radiation, &c., on plant growth, factors which are recognised to be of great economic importance. (See Table IV.)

The preliminary work being now well in hand, a much more comprehensive scheme is in preparation for next season, although several items involving extra capital expenditure have been suspended till more prosperous times, and the current expenses have been reduced as much as possible.

As soon as funds permit it is proposed to add a chemist to the scientific staff, and to erect glasshouses for experiments in the cultivation of grapes, roses, fruit, flowers, &c.

Experimental Crop Records.

I. TOMATOES.

There are five tomato culture houses, each 100 feet long by 26 feet wide, giving a total area of .2984 of an acre.

The treatment last season was uniform and consisted of giving lime to each house at the rate of sixteen tons to the acre; straw manure at the rate of forty tons to the acre; and bone-meal at the rate of two and a half tons to the acre; the subsequent treatment as regards mulching, top-dressing, watering, &c., being the same also.

The total tonnage of fruit was 18 tons 8 cwts. 1 qr. 19 lbs. 6 ozs., which works out to 61 tons 15 cwts. to the acre.

The total number of strikes* of tomatoes sent to market was 3,262, consisting of 1,007 Pink, 809 Pink and White, 51 Cross Pink and White, 994 Blue, 313 White, 81 Blue and White, and 7 Chats.

The result of the standardisation of the soil in the tomato houses is given in Table I.

* Strikes are baskets holding 12 lbs. of fruit and graded according to size and quality from Pink down to Chats.

Weights of crops from the Tomato Houses, the manurial and other treatment being alike in each case.

TABLE I.

Variety.	No. of Plants per House.	House No. 1.				House No. 2.				House No. 3.				House No. 4.				House No. 5.				Total.				Average per plant.			
		Tons.	Cwts.	Qrs.	Lbs.	Ozs.	Average per plant.	Tons.	Cwts.	Qrs.	Lbs.	Ozs.	Average per plant.	Tons.	Cwts.	Qrs.	Lbs.	Ozs.	Average per plant.	Tons.	Cwts.	Qrs.	Lbs.	Ozs.	Average per plant.	Lbs.	Ozs.		
1 Balch's Fillbasket ...	72				7	0 18	2 11	2					7	0 26	14 11	4													
2 Balch's Ailsa Craig ...	162				16	0 14	12 11	2					15	1 25	2 10	11													
3 Tuckswold Favourite ...	72				6	0 24	9 9	11					6	0 21	14 9	10													
4 Kondine Red ...	144				12	1 18	8 9	10					13	1 7	11 10	6													
5 Balch's Jolly Boy ...	72				6	0 7	14 9	7					6	0 0	4 9	5													
6 Hammerston's Romford	72				5	3 10	3 9	1					5	3 14	5 9	2													
7 Carter's Sunrise ...	72				5	1 0	2 8	3					6	0 21	7 9	10													
8 Harrison's Favourite ...	9				2	14 7	7 12						2	15 2	7 14														
9 Hillside Comet ...	72				5	2 15	6 8	12					4	3 21	11 7	11													
10 Comet ...	72				5	0 18	4 8	1					4	3 21	13 7	11													
11 Buck's Tresco ...	18				1	0 23	14 7	9					1	0 9	2 6	12													
12 Lister's Prolific ...	9				2	14 10	7 14						2	17 15	8 3														
13 Balch's Water Baby ...	54				3	2 4	14 7	6					4	0 4	11 8	6													
14 Wonder of Italy ...	9				2	1 13	6 7						1	27 8	6 3														
15 Yellow Fruited Type ...	9				1	19 8	5 4						1	3 10	3 8														
Totals and Average per Plant per House.	918	3 16	3 10	14 9	6 3	19 3	13 5	9 12	3 16	0 15	7 9	5 3	8 3	21 14 8	7 3	6 2	13 14 8	2 18	8 1	19 6 9	0								

Standardisation of soil in five Tomato Houses.

ISOLATION HOUSE.

Pot Experiments with "Humogen" on Tomatoes.

In these experiments twenty-four plants of each of seven varieties of tomato were grown in 12in. pots in six different potting mixtures, with four plants of each variety to each mixture as follows:—

- No. 1. Loam and well-rotted stable manure (3 to 1), 29 parts, and bone-meal, one part.
 No. 2. Loam and "Humogen," in proportion of nine to one (1 in 10).
 No. 3. Loam and "Humogen" (9 to 1), 29 parts, plus one part of bone-meal.
 No. 4. Loam and peat-moss-litter (9 to 1), 29 parts, and bone-meal, one part.
 No. 5. Loam and "Humogen" (9 to 1), 499 parts, plus one part of insoluble rock phosphate.
 No. 6. Loam and well-rotted stable manure (9 to 1), 499 parts, plus one part of insoluble rock phosphate.

The weights of fruit recorded from each set were as follows:—

TABLE II.

Variety.	Potting Mixture No. 1.				Potting Mixture No. 2.				Potting Mixture No. 3.				Potting Mixture No. 4.				Potting Mixture No. 5.				Potting Mixture No. 6.			
	cwts.	qrs.	lbs.	ozs.	cwts.	qrs.	lbs.	ozs.	cwts.	qrs.	lbs.	ozs.	cwts.	qrs.	lbs.	ozs.	cwts.	qrs.	lbs.	ozs.	cwts.	qrs.	lbs.	ozs.
Comet			25	13			23	11			23	0			26	1			24	11			23	2
Balch's Fillbasket ...			34	2			31	5			23	1			27	15			28	3			22	10
Tuckswood Favourite ...			33	8			32	11			22	3			21	14			29	11			27	13
Kondine Red			29	15			29	5			23	13			25	1			21	2			24	1
Hammerston's Romford			24	5			24	4			24	9			28	5			24	12			25	0
Balch's Ailsa Craig ...			35	4			27	13			25	6			25	9			26	10			20	9
Balch's Water Baby ...			20	3			21	14			21	15			18	14			17	0			22	2
Totals.	1	3	7	2	1	2	22	15	1	1	13	15	1	2	5	11	1	2	4	1	1	1	25	5

II. CUCUMBERS.

The cucumber culture houses consist of three which are 100 feet long by 13 feet wide, and two which are 75 feet long by 13 feet wide, giving a total border length of 880 feet. The total number of plants was 440, being planted two feet apart in the borders.

The total number of fruits picked was 33,504, with an aggregate weight of 13 tons 11 cwts. 1 qr. 20 lbs., giving an average of $14\frac{1}{2}$ ozs. per fruit, the average per plant being 69 lbs. of fruit.

884 flats* were sent to market of an average weight of 45 lbs. each when packed, consisting of 73 $2\frac{1}{2}$ dozens, 362 3 dozens, 356 $3\frac{1}{2}$ dozens, 74 4 dozens, 18 crooks and 1 small.

* Flats are baskets in which cucumbers are packed according to size, so that a certain number of dozens fills the basket when packed with hay and tissue paper in four layers.

Border Experiments with "Humogen" on Cucumbers.

In these experiments, eighteen plants of each of two varieties of cucumber were grown, nine plants of each variety in each of the following mixtures:—

No. 1. Loam and well-rotted stable manure (2 to 1) 8 parts, and one part of "Humogen" (1 in 9).

No. 2. Loam and well-rotted stable manure, equal quantities of each.

After planting out in above borders the subsequent treatment was the same and the crop records are given in Table III.

TABLE III.

Variety.						No. of Fruits	cwts.	qrs.	lbs.
1	Butcher's "Disease Resister"					457	3	2	20
2	" " " " " "					452	3	2	16
3	Rochford's "Market"					452	3	2	22
4	" " " " " "					459	3	3	3
1 and 3 with "Humogen"						909	7	1	14
2 and 4 without "Humogen"						911	7	1	19

Physiological Records.

As a preliminary experiment the effect of temperature on crop production was observed in four cucumber houses, and for this purpose each house was divided into two parts, the bottom end near the boilers being slightly warmer than the top end in each case, and the temperature of each half house was taken every two hours, from 6 a.m. to 6 p.m., together with the night minimum and the day maximum. A record of the numbers and weights of fruits together with the average temperatures to the nearest degree Fahrenheit is given below in Table IV.

TABLE IV.

April, 1915.

House No.	Min.	Max.	Day.	No. of Fruits.	Cwts.	Qrs.	Lbs.
1 Top half	67	94	84	528	4	1	14
1 Bottom half	68	94	85	470	3	3	3
2 Top "	67	91	81	458	3	2	26
2 Bottom "	68	92	83	407	3	1	7
3 Top "	67	90	80	583	4	3	4
3 Bottom "	68	92	82	529	4	0	25
4 Top "	67	93	82	249	1	3	18
4 Bottom "	68	94	83	202	1	2	9

May, 1915.

1 Top half	67	94	84	926	8	2	4
1 Bottom half	68	94	85	742	6	3	17
2 Top "	67	91	81	922	7	3	24
2 Bottom "	68	92	83	673	6	0	3
3 Top "	67	90	80	965	8	1	17
3 Bottom "	68	92	82	786	6	3	6
4 Top "	67	93	82	618	5	2	0
4 Bottom "	68	94	83	527	4	3	2

June, 1915.

1 Top half	68	94	85	803	6	2	26
1 Bottom half	69	94	86	615	5	1	11
2 Top "	69	92	83	836	7	0	27
2 Bottom "	70	94	85	614	5	0	20
3 Top "	68	93	82	884	7	1	14
3 Bottom "	69	95	84	616	5	0	8
4 Top "	69	94	84	592	5	0	18
4 Bottom "	70	96	86	500	4	1	17

July, 1915.

House No.	Min.	Max.	Day.	No. of Fruits.	Cwts.	Qrs.	Lbs.
1 Top half ...	69	95	84	765	5	3	25
1 Bottom half ...	70	96	85	529	4	0	7
2 Top ...	69	92	83	887	7	1	11
2 Bottom ...	70	94	84	580	4	3	6
3 Top ...	66	92	81	900	6	3	22
3 Bottom ...	68	94	83	543	4	1	12
4 Top ...	69	94	80	503	3	3	14
4 Bottom ...	70	95	82	460	3	2	23

August, 1915.

1 Top half ...	69	93	82	615	4	2	20
1 Bottom half ...	70	94	83	438	3	1	15
2 Top ...	69	90	81	669	5	1	20
2 Bottom ...	70	92	83	435	3	1	16
3 Top ...	67	91	80	681	5	0	16
3 Bottom ...	68	93	82	451	3	2	2
4 Top ...	69	92	81	368	2	3	9
4 Bottom ...	70	93	82	403	3	0	20

September, 1915.

1 Top half ...	64	93	80	561	4	0	1
1 Bottom half ...	65	94	81	361	2	2	8
2 Top ...	65	89	78	546	3	3	14
2 Bottom ...	67	90	80	381	2	3	11
3 Top ...	63	90	77	525	3	2	14
3 Bottom ...	65	92	79	365	2	2	1
4 Top ...	63	91	78	320	2	0	17
4 Bottom ...	64	93	79	276	1	3	15

October, 1915.

1 Top half ...	63	86	75	308	1	1	24
1 Bottom half ...	64	88	76	259	1	0	11
2 Top ...	64	86	74	216	1	0	20
2 Bottom ...	66	89	76	272	1	0	27
3 Top ...	62	85	74	269	1	2	2
3 Bottom ...	64	87	76	385	1	3	11
4 Top ...	63	85	74	176		3	15
4 Bottom ...	66	87	76	140		2	17

Summary of Table IV.

April to October, 1915.

AVERAGES.				TOTALS.					DIFFERENCES.			
House No.	Min.	Max.	Day.	No. of Fruits	Tons	cwts	qrs.	lbs.	No. of Fruits	cwts	qrs.	lbs.
1 Top half ...	66	92	81	4506	1	15	3	2	1092	8	2	14
1 Bottom half ...	68	93	82	3414	1	7	0	16				
2 Top " ...	67	90	80	4534	1	16	3	2	1172	9	3	24
2 Bottom " ...	68	92	81	3362	1	6	3	6				
3 Top " ...	66	90	79	4807	1	17	3	5	1132	9	1	24
3 Bottom " ...	67	92	81	3675	1	8	1	9				
4 Top " ...	66	91	80	2826	1	2	1	7	318	2	0	16
4 Bottom " ...	67	93	81	2508	1	0	0	19				

APPENDIX.

Notes on the weather of the growing season of 1915. January—October.

The month of JANUARY was humid, dull and mild, and the rainfall was above the average. There was very little direct sunlight, and conditions altogether were not good for early crops.

FEBRUARY was similar in every respect to the previous month. Young plants raised in heat under these conditions were inclined to be weak, sunlight being essential to sturdiness of growth.

In MARCH the weather generally was mild and dull, but there was very little wind. There were two exceptionally sunny days on the 14th and 16th respectively. The dull weather appeared to be the cause of a general complaint that cucumber growth was slow. Early tomatoes, however, were up to their average, there being good sets, and rapid swelling of fruits towards the latter part of the month.

APRIL was dry, with a good amount of sunlight, and all crops grew exceptionally well.

MAY was in every respect similar to April.

JUNE was a bright dry month, with warm days but cold nights.

The weather of JULY was of a mixed character, some days being warm and sunny, but the majority were dull and wet. The nights were cold and moist and growers were generally complaining about the difficulty of controlling the Tomato "Mildew" (*Cladosporium fulvum*).

AUGUST, SEPTEMBER AND OCTOBER were on the whole very good months from a grower's point of view. There was a good amount of sunlight especially in the latter month, and atmospheric conditions were warm with little wind. The rainfall for the whole season was above the average.
